

CLAIMS

1. A pipe renovating method, comprising the steps of:
 - supplying a mixture of pressurized gas and particles of abrasive material from a gas and particle mixture supply into a first port of a pipe system at a first flow rate;
 - connecting a second port of the pipe system to a vacuum at a second flow rate, whereby the mixture is pumped in at the first port and sucked out at the second port so as to be conveyed along the pipe with the abrasive particles cleaning the inner surface of the pipe along a predetermined pipe section between the first and second ports; and
 - the second, vacuum flow rate at the second port being higher than the first, input flow rate at the first port, whereby the pressurized gas and abrasive material will be steered from the first port to the second port.
2. The method as claimed in claim 1, wherein the ratio between the first and second flow rates is in the range from 10% to 90% and 40% to 60%.
3. The method as claimed in claim 2, wherein the ratio is around 20%: 80%.
4. The method as claimed in claim 1, including the steps of determining when the inner surface of the pipe has been sufficiently cleaned by the abrasive material particles and subsequently coating the inner surface of the cleaned pipe with a coating material.

2 5. The method as claimed in claim 4, wherein the coating material is an epoxy resin.

2 6. The method as claimed in claim 4, wherein the step of coating the
4 inner surface of the pipe comprises pumping a mixture of gas and liquid
6 coating material into a selected port of the pipe at a first flow rate while
applying suction to the second port of the pipe at a second flow rate, the
second flow rate being higher than the first flow rate so as to steer the
mixture of gas and liquid coating material in a predetermined direction
from the selected port to the second port.

2 7. The method as claimed in claim 6, wherein suction is applied with a vacuum pump.

2 8. The method as claimed in claim 6, including the step of determining
4 the quantity of coating material required to coat the inner surface of the
pipe to a predetermined depth based on the length and diameter of the
pipe, and terminating the coating step after the determined amount of
material has been supplied to the pipe.

2 9. The method as claimed in claim 4, including the step of applying a second layer of coating material to the inner surface of the pipe.

2 10. The method as claimed in claim 1, including the step of drying the
4 pipe prior to cleaning the pipe with the mixture of air and abrasive material
particles, the drying step comprising pumping heated air into the first port
of the pipe while applying suction at the second port of the pipe.

2 11. The method as claimed in claim 4, including the step of heating the
4 pipe to a predetermined temperature prior to coating the pipe, the heating
6 step comprising pumping heated air into the first end of the pipe and
applying suction at the second end of the pipe until first and second
predetermined air temperatures are detected at the first and second ends,
respectively, of the pipe, and the coating step commencing as soon as
said predetermined air temperatures are reached.

2 12. The method as claimed in claim 1, including the step of monitoring
the pressure in the pipe and relieving the pressure if the detected pressure
is above a predetermined safety level.

2 13. The method as claimed in claim 4, including the step of testing the
pipe for any leaks after the cleaning step and prior to the coating step.

2 14. The method as claimed in claim 4, including the step of determining
the coating layer thickness after the pipe coating step is complete.

2 15. The method as claimed in claim 1, including the steps of:
determining when the pipe section between the first and second
ports has been sufficiently cleaned;
4 disconnecting the supply of gas and abrasive particles from the first
port and connecting it to a third port in the pipe system;
6 repeating the steps of supplying the gas and abrasive particle
mixture to the third port and sucking the mixture out at the second port at
8 a higher flow rate, whereby a second pipe section between the third port
and second port is cleaned;
10 repeating the procedure at all access ports in the pipe system until
the entire pipe system is cleaned; and

12 the ratio between the first and second flow rates for each pipe
section being adjusted for each new pipe section to be cleaned to steer
14 the gas and abrasive particle mixture in a predetermined direction along
the selected pipe section.

16. The method as claimed in claim 15, further comprising the steps of:

2 determining when the inner surface of the entire pipe system has
been sufficiently cleaned by the abrasive material particles;

4 supplying a mixture of gas and liquid coating material into a
selected first port of the pipe system at a first flow rate while applying
6 suction to the second port of the pipe system at a second flow rate, the
second flow rate being higher than the first flow rate so as to steer the
8 mixture of gas and liquid coating material in a predetermined direction
along a predetermined first pipe section from the selected first port to the
10 second port;

 after the first pipe section has been sufficiently coated,
12 disconnecting the mixture of gas and liquid coating material from the first
port and connecting it to a third port of the pipe system at a
14 predetermined flow rate while applying suction to the second port at a
higher rate so as to steer the mixture of gas and liquid coating material
16 along a predetermined second pipe section until the second section is
sufficiently coated; and

18 repeating the coating procedure until the entire pipe system has
been coated.

17. A system for renovating pipes, comprising:

2 a supply of pressurized gas, the gas supply having an outlet;
 a first control device for controlling a gas input flow rate from the
4 supply;

6 a first mixing machine connected to the outlet of the gas supply
and having an inlet for supply of abrasive particles to the machine for
8 mixing with the gas and an outlet for the mixture of pressurized gas and
abrasive particles;

10 a first hose for selectively connecting the mixing machine outlet to
a selected first port of a pipe system;

a vacuum pump;

12 a second control device for controlling the vacuum pump suction
flow rate;

14 a second hose having a first end connected to the vacuum pump
and a second end for selective connection to a selected second port of the
16 pipe system, whereby the mixture of gas and abrasive particles is blown
into the first port and sucked out at the second port in order to clean the
18 pipe; and

20 the vacuum pump suction flow rate being higher than the gas input
flow rate.

2 18. A pipe renovating system for cleaning successive pipe sections in a
pipe system, comprising:

a supply of pressurized gas for supplying gas at a first flow rate;

4 a supply of abrasive particles for mixing with the pressurized gas;

6 a connecting device for connecting the mixture of gas and abrasive
particles to a selected first port of a pipe system;

8 a vacuum pump for connection to a selected second port in the
pipe system to provide a second, suction flow rate;

the second flow rate being higher than the first flow rate;

10 whereby the mixture of gas and abrasive particles is blown into the
first port and sucked out at the second port in order to clean a
12 predetermined pipe section between the first and second ports.

2 19. The system as claimed in claim 18, wherein the ratio between the first and second flow rates is in the range from 5%:95% to 40%:60%.

2 20. The system as claimed in claim 19, wherein the ratio between the first and second flow rates is in the range from 10%:90% to 30%:70%.

2 21. The system as claimed in claim 20, wherein the ratio is approximately 20% to 80%.

2 22. The system as claimed in claim 18, including a mixing unit for providing a supply of liquid coating material mixed with gas, the mixing unit having a first inlet for pressurized gas, a second inlet for coating material, and an outlet, and a valve assembly for selectively connecting the mixing unit in line between the pressurized gas supply and a selected port of a pipe system in place of the supply of abrasive particles.

2 23. The system as claimed in claim 18, wherein the supply of pressurized gas comprises an air compressor.

2 24. The system as claimed in claim 18, including at least one pressure control monitor for monitoring the pressure in the system and for relieving the pressure if a predetermined safety level is exceeded.